EXECUTIVE SUMMARY

Recent wide spread declines of some amphibian populations have resulted in an increased interest by resource managers in the status of the amphibian populations in their resource areas. When managers attempt to locate current, region specific data on amphibian populations, they often fail because of a lack of information. However, to make site specific management decisions for amphibians, managers must know what species occur in their area. The goal of this three year project (springs and summers of 1994, 1995, and 1996) was to determine the occurrence, distribution, and relative abundance of amphibians on Bureau of Land Management (BLM) Lands in the Coeur d'Alene Basin in northern Idaho. This final report presents and summarizes all data collected during this survey.

To achieve this goal, we conducted amphibian surveys at 14 ponds and 21 streams. We captured 9 of the 10 species of amphibians that potentially occur in the study area. Seven of the potential species are pond breeders, 2 are stream breeders, and 1 lays eggs on land. Therefore, we needed to use several techniques to achieve our goal.

The most widely distributed and abundant pond breeding amphibian was the Long-toed Salamander (*Ambystoma macrodactylum)*, followed by the Spotted Frog (*Rana pretiosa*), Pacific Treefrog (*Pseudacris regilla*), Western Toad (*Bufo boreas*), and the Bullfrog (*Rana catesbeiana*). The most widely distributed and abundant stream dwelling amphibian was the Tailed Frog (*Ascahpus truei*) followed by the Idaho Giant Salamander *(Dicamptodon aterrimus*). We found Coeur d'Alene Salamanders (*Plethodon idahoensis*) to be widely dispersed and locally abundant in the study area.

We suggest three future projects that would improve our knowledge of the herpetofauna of the Coeur d'Alene Basin. First, a monitoring program for amphibians should be initiated. After three years of surveys, we probably have a reasonable representation of what amphibians occur in the Coeur d'Alene Basin. A monitoring program would allow resource personnel to observe trends in amphibian occurrence over time in the study area. The second suggested project is a survey of Northern Alligator Lizards (*Elgaria coerulea*). Third, if possible, adaptive management and monitoring of amphibian and reptile populations should be attempted on a case by case basis.

INTRODUCTION

Recent wide spread amphibian declines have caught the attention of many wildlife managers. They have become increasingly interested in the status of the amphibian populations in their resource areas. However, when managers attempt to locate current, region specific data on amphibian populations, they often fail because of a lack of information. In the Pacific Northwest, data are often lacking on the limits of species distributions, species ecology, and life history (Nussbaum et al. 1983). As the scale of interest is changed from regional (Pacific Northwest) to local (a county), data on the occurrence, distribution, and abundance of species become harder to locate. Unfortunately, these types of data are needed to evaluate the potential effects of local land-use practices on amphibian populations (Patla and Peterson 1996, Sullivan and Peterson 1996). Therefore, the first step in developing amphibian management plans should be surveys to determine occurrence, distribution, and relative abundance of the potential species.

The goal of this three year project (springs and summers of 1994, 1995, and 1996) was to determine the occurrence, distribution, and relative abundance of amphibians on Bureau of Land Management (BLM) Lands in northern Idaho (Fig. 1). To obtain this goal, we conducted pond and/or stream surveys for amphibians in four areas (1) along U. S. Interstate 90 from Wallace, Idaho to Coeur d'Alene, Idaho; (2) along Latour Creek south of Cataldo; (3) along Coeur d'Alene lake south of Coeur d'Alene; and (4) around Lake Pend Oreille. Ten species of amphibians potentially occur in the study area. Seven of the potential species are pond breeders, two are stream breeders, and one lays eggs on land. Therefore we used several techniques to achieve our goal. This final report presents and summarizes all data collected during this survey.

METHODS

Study Area

We conducted this study in the Coeur d'Alene region of Northern Idaho (Fig. 2). The majority of the survey points occurred along U. S. Interstate 90 from Wallace, Idaho to Coeur d'Alene, Idaho. However, we also surveyed several sites outside of this corridor. We sampled two bays south of Coeur d'Alene along Lake Coeur d'Alene (Mica Bay and Loff's Bay), two lakes around Lake Pend Oreille (Gamlin and Antelope lakes), and several sites along Latour Creek south of Cataldo (Table 1). We selected a total of 14 ponds and 21 streams to survey.

Because of the fragmented and often disturbed nature of BLM land in the study area, we did not select survey sites randomly. Rather, we sampled any potential site on BLM land that we felt would contain amphibians including ponds, streams, bays, and seeps. To assist site selection, Scott Robinson (Wildlife Biologist, BLM, Coeur d'Alene District), suggested specific survey sites and provided 1:24000 scale U.S.G.S topographic maps with BLM land holdings outlined.

Site characteristics were variable. Sites ranged in elevation from approximately 900 m (3000 feet) along the Coeur d'Alene River to 1590 m (5300 feet) at Crystal Lake. The area along the Interstate 90 corridor has been highly disturbed by mining.

Sources of Information

We used several sources of information to generate a probable species list for the study area. We used the range maps in Stebbins (1985) to determine which species were likely to occur in the study area. We then checked this list against dot-distribution maps for the state (Nussbaum et al. 1983). Lastly, we consulted the Northern Intermountain Herpetological Database (Idaho Museum of Natural History) for museum records of potential amphibian (Table 2a) and reptile species (Table 2b).

Field Surveys

We selected 14 ponds and 21 streams to survey. Each site was visited at least twice each year. We attempted to temporally space the survey dates to optimize the chances of correctly detecting species occurrence at each site. One survey was conducted in the early spring to determine occurrence and breeding activity, and the second survey was conducted in the summer to determine species occurrence and reproductive success.

The methodology for conducting pond surveys was different than the methodology for stream surveys. In each case we followed the U S. Fish and Wildlife Service protocol developed by Stephen Corn to collect data (Heyer et al. 1994). The protocol used for pond surveys was as follows. Timing ourselves, we walked the edge of the pond and looked for adult amphibians and egg masses. Because larvae are sometimes difficult to observe, we periodically used a dipnet to sample for larvae. We also turned any cover objects that were adjacent to the ponds. If possible, we walked across the pond to determine maximum depth. At each pond we measured pH (Oakton, pH Testr 2, accurate +/- 0.2, Forestry Suppliers, Inc. Jackson, MS), water conductivity (TDS Testr Oakton accurate +/- 2%, Forestry Suppliers, Inc. Jackson, MS) and water temperature (Quick Reading Miller-Weber Cloacal Thermometer, Queens, NY).

The protocol used to survey streams was as follows. We sampled three types of streams. Examples of the three types are as follows: (1) relatively large (approximately 1.5-3 m wide) with sparse canopy cover (Fig. 7), (2) smaller streams (<1.5 m wide) with complete canopy cover (Fig. 8), and (3) streams that have been "restored" (Fig. 9). We surveyed an approximately 100 m reach of each stream. We timed ourselves as we walked upstream turning rocks with a net held below. If a Tailed Frog (*Ascaphis truei*) or Idaho Giant Salamander (*Dicamptodon aterrimus*) was under the rock it would usually be washed into the net. At each stream we measured pH, water conductivity, and water temperature. We also found that, at low flow, some high gradient streams became a series of isolated pools. In this situation, we were able to walk up the reach of stream, peer into the pools, and see Tailed Frog tadpoles if they were present.

We also recorded observations of amphibians and reptile that were incidental to the survey sites. Incidental sites were areas that we located while driving to a specific survey

site. If we found appropriate habitat, we searched there. These sites were only visited once, and searching ended when one individual was found. Incidental reptile sitings were usually opportunistic observations at survey sites or were observed as "road-kill".

Mapping

Each site is represented on a scan of a 7.5 minute series topographic map. Facing each figure, is a summary table of the site location, site type, species breeding, and remarks. Several steps were required to prepare the maps of the survey sites for amphibians from the 1994, 1995, and 1996 field surveys (Figs. 11-33). While in the field, we marked the locations of survey sites on copies of USGS 7.5 minute series topographic maps. In the laboratory, we scanned in the appropriate portions of the topographic maps with a Hewlett-Packard ScanJet IIcx scanner. The maps were scanned in as 256-color photo images at 180 dpi with normal sharpening, and saved as TIFF files. The TIFF files were then imported into Corel Draw 4.0 (Corel Corporation, Ottawa, Ontario, Canada). We added the site numbers and abbreviations for the amphibian and reptile species observed and then printed the maps with an Epson Color Stylus printer at 360 dpi. These maps give the most precise indications of our amphibian and reptile observation locations. We did not show the historical records on these maps because the accuracy of their locations is not as high as the 1994, 1995, and 1996 survey sites.

UTM coordinates for the 1994, 1995, and 1996 survey sites were obtained using a 36" x 48" CalComp 9500 digitizing table (CalComp, Scottsdale, AZ) to digitize coordinates from the USGS 7.5 minute series topographic maps. These coordinates should be accurate to within tens of meters. Table 1 lists the coordinates for all 1994, 1995,and 1996 survey sites.

Data Analysis

The fragmented nature of BLM land in the study area precluded a random sample of a sufficient number of pond sites to draw statistically meaningful conclusions about pond breeding amphibians. Thus, we used descriptive statistics to analyze these data.

For the stream dwelling amphibians (Tailed Frogs) we used Exact Testing (SPSS Exact Tests 6.1 for Windows, Mehta and Patel, SPSS Inc. Chicago, IL, 1995) to determine if there were any relationships between Tailed Frog occurrence and fish presence or the presence of a mine within 2 miles upstream of the sample site. However, these analyses were *post hoc* and the results of the analyses are specific to the sites that we sampled -i.e., we could not draw broad conclusions about the amphibian populations outside the study area. This study was not intended to determine the effects of mining on amphibian populations. We consider the test against mine presence to be exploratory, for the purpose of guiding future research.

RESULTS AND DISCUSSION

Possible Species

We searched of The Idaho Museum of Natural History Database of reptiles and amphibians for museum records from Benewah, Bonner, Kootenai, and Shoshone counties. Our search revealed that there are museum records for 10 species of amphibians from the study area (Table 2a). These species include: the Long-toed Salamander (*Ambystoma macrodactylum*), the Tiger Salamander (*Ambystoma tigrinum*), the Idaho Giant Salamander (*Dicamptodon aterrimus*), the Coeur d'Alene Salamander (*Plethodon idahoensis*), the Western Toad (*Bufo boreas*), the Pacific Treefrog (*Pseudacris regilla*), the Tailed Frog (*Ascaphus truei*), the Bullfrog (*Rana catesbeiana*), the Northern Leopard Frog (*Rana pipiens*), and the Spotted Frog (*Rana pretiosa*). We found 9 out of 10 potential species in the study area. Although there are museum records for Leopard Frogs within the northern portion of the study area, we failed to locate any Leopard Frog sites.

Four of the 10 species are afforded special state status. The Coeur d'Alene Salamander, the Western Toad, the Leopard Frog, and the Spotted Frog are classified as Idaho Department of Fish and Game Species of Special Concern and as BLM Sensitive species. In addition, the United Sates Fish and Wildlife Service (The Snake River Basin Field Office, Boise, ID) considers the Coeur d'Alene Salamander as a Watch species and the Western Toad as Watch/Species of Concern (Conservation Data Center Home Page, World Wide Web 1997).

Pond Breeding Amphibians

Long-toed Salamander

Long-toed Salamanders (*Ambystoma macrodactylum)* were widely distributed in the study area. They were present at 9 of the 14 pond sites sampled, and were relatively the most abundant of all pond breeding amphibians. Larvae were observed at all sites where they were found. Long-toed Salamander breeding habitat was characterized as permanent or ephemeral ponds, generally with emergent vegetation along the shoreline (Fig. 3). Fish were never observed in the areas where Long-toed Salamander larvae were found (See Appendix 1 for list of site characteristics).

Tiger Salamander

In 1995 we found one Tiger Salamander (*Ambystoma tigrinum*). This individual (found dead) was located in an area known to have fish (Gold Run Ponds) and was presumed to have been fish bait.

Spotted Frog

Spotted Frogs (*Rana pretiosa*) were found to be distributed across the study area, and were the second most abundant pond breeding amphibian. Spotted Frogs were present at 6 of the 14 pond sites and eggs were observed at two sites. In the study area, Spotted Frogs were found to inhabit permanent ponds and the wet marshy areas adjacent to these ponds (Fig. 4). At all sites where Spotted Frogs were found, there were shallows with emergent and submergent vegetation.

Pacific Treefrog

Our data suggest that Pacific Treefrogs are not widely distributed or abundant in the study area. Pacific Treefrogs were present at two sites in the study area and we observed tadpoles at both sites. In the study area, Pacific Treefrogs were found in small ponds (including oxbow ponds) generally with emergent vegetation along the shoreline (Fig. 3).

Western Toad

Our data also suggest that Western Toads are not widely distributed or abundant in the study area. Western Toads were presence at two sites in the study area and we observed tadpoles at both sites. The two Western Toad sites were different. One site was a shallow marshy area connected to Lake Coeur d'Alene. The other was a large pond, lacking emergent vegetation, adjacent to the Coeur d'Alene River (Fig. 5).

Bullfrog

Unfortunately, we located one site with breeding Bullfrogs (Fig. 6) (Gamlin Lake). Bullfrogs (*Rana catesbeiana*), an introduced species, were the only amphibians found at that

site. This site was southwest of Sandpoint and adjacent to Lake Pend Oreille. Bullfrogs in Gamlin Lake may present a threat to native amphibian populations in the neighboring area if people transplant Bullfrogs from Gamlin to lakes in the Pend Oreille area. If possible, Bullfrogs should be removed. In addition, educational signs should be placed around the lake warning people not to take live Bullfrogs from Gamlin Lake to other lakes. Hopefully, this may slow the expansion of Bullfrog populations in the area.

Stream Breeding Amphibians

Tailed Frog

The most widely distributed and abundant stream dwelling amphibian was the Tailed Frog (*Ascahpus truei*). Tailed Frogs occurred at 9 of the 21 sites surveyed and tadpoles were found at all sites where Tailed Frogs occurred. We found adult Tailed Frogs at two sites, and three age classes of tadpoles (1 site with 3rd year tadpoles, 7 sites with 2nd year tadpoles, and 5 sites with 1st year tadpoles). Tailed Frog habitat was characterized by relatively fast moving rocky streams with little or no sediment load. The presence of tailed frogs was not positively or negatively associated with the presence of a mine two miles upstream (Fisher's Exact Test, $p = 0.20$) or the presence of fish ($p = 1.0$).

Idaho Giant Salamander

The other stream dwelling amphibian captured was a larval Idaho Giant Salamander (*Dicamptodon aterrimus*). We only found one site (Dry Creek) and one individual in three years of surveys. However, Idaho Giant Salamanders may be more wide-spread and more abundant than our data indicate. The site where the larval Idaho Giant Salamander was captured was a small stream (< 1m wide). The Substrate consisted of large cobbles (15 cm in length) and woody debris. There was complete canopy closure. This creek was dry in 1995. In 1996 Dry Creek was flowing, and we found Tailed Frog tadpoles and the larval Idaho Giant Salamander.

Terrestrial Salamanders

We found Coeur d'Alene Salamanders (*Plethodon idahoensis*) at four of the survey sites (Table 1). We also found 10 incidental Coeur d'Alene Salamander sites (Table 3). Coeur d'Alene Salamanders sites were abundant and widely dispersed in southern portion of

the study area. Coeur d'Alene Salamaner habitat usually consisted of small talus or scree, with a water source (splash zone) in the talus or adjacent to it.

Management Considerations

Monitoring

We feel that the next step in this project should be to initiate a monitoring program for amphibians. After three years of surveys, we probably have a reasonable representation of what amphibians occur in the Coeur d'Alene Basin. A monitoring program would allow resource personnel to observe trends in the amphibian occurrence over time in the study area.

We selected 10 sites that are suitable for amphibian long-term monitoring (Table 4). We used the following criteria for monitoring site selection, (1) sites had to cover the study area spatially; (2) sites had to cover the range of habitats (low and high elevation ponds, forested streams, open canopy streams, and restored streams); (3) sites had to incorporate all species, with a minimum of 2 sites per species; (4) when possible, sites had to be on BLM land; and (5) all monitoring had to be able to be completed in approximately two days per season.

Monitoring consists of repeated surveys of the same site over time (e.g., consecutive years). The goal of monitoring is to determine trends in the occurrence of amphibian species over time. The sites in Table 4 should be monitored for amphibians using the same protocol used in the initial surveys (See Methods). To monitor long term trends in terrestrial salamanders follow the Coeur d'Alene Salamander Assessment (Cassirer et al. 1994).

Incidental Searching

We are lacking information about the distribution and abundance of Idaho Giant Salamanders, Western Toads, and Pacific Treefrogs in the study area. We suggest that if resource personnel come upon a new/unsurveyed pond or stream, they should search for these three species. If time allows, BLM personnel should be trained to be able to properly identify amphibians and amphibian habitat in the field. This extra effort should improve our understanding of distribution and abundance of Idaho Giant salamanders, Western Toads, and Pacific Treefrogs in the study area.

Northern Alligator Lizard surveys

Northern Alligator Lizard (*Elgaria coerulea*) surveys should be conducted in the study area. The Northern Alligator Lizard is classified as an S2 ? species by the Idaho Natural Heritage Program and a Watch species by the USFWS (The Snake River Basin Field Office, Boise, ID). Very little is known about it in Idaho.

Adaptive Management

We suggest that, if possible, BLM personnel should undertake adaptive management and monitoring of amphibian populations on a case by case basis. For example, before roads are widened or newly constructed on BLM lands, managers could survey for amphibians. If the proposed project would potentially impact amphibian habitat, managers could take actions to protect the habitat. Actions may be as minor as not widening a road in an area of known Coeur d'Alene Salamander habitat, or as drastic as re-routing the roads away from known habitat. However, protecting all habitat is not always possible. Therefore, we suggest that if a project will alter known amphibian habitat, surveys should be conducted before and after the disturbance to determine possible impacts. These types of surveys may provide base-line data about species response to disturbance and possibly the time it takes for species to recolonize disturbed habitats.

LITERATURE CITED

Cassirer, E. F., C. R. Groves, and D. L. Genter. 1994. Coeur d'Alene Salamander conservation assessment. USDA Forest Service Region 1. 54 p.

Nussbaum, R. A., E. D. Brodie, Jr., and R. M. Storm. 1983. Amphibians and Reptiles of the Pacific Northwest. Moscow, Idaho: University of Idaho Press.

Heyer, W. R., Donnelly, M. A., McDiarmid, R. W., Hayek, L. C., and M. S. Foster. 1994. Measuring and Monitoring Biological Diversity. Standard Methods for Amphibians. Washington, D. C. Smithsonian Institution Press.

Patla, D. A. and C. R. Peterson. 1996. Amphibians and reptiles along the Grand Loop Highway in Yellowstone National Park: Tower Junction to Canyon Village. Final Report to Yellowstone National Park. 49 p.

Stebbins, R. C. 1985. Western Reptiles and Amphibians. Boston: Houghton Mifflin Company.

Sullivan, S. R. and C. R. Peterson. 1996. Amphibians and reptiles along the highway in Yellowstone National Park: Tower Junction to the northeast entrance. Final Report to Yellowstone National Park. 60 p.